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A
TREATISE
On the Nature of
Aliments, or Foods, in General.

[Price One Shilling.]

BRITISH MUSEUM
30 JUL 53

A

TREATISE

On the Nature of

Aliments, or Foods, in General;

SHEWING

Their good and bad Qualities; and which of them
are moſt proper in the different Stages of Life.

To which is Added,

An ESSAY

ON THE

NATURE of DIGESTION,

And the Vital Powers by which it is performed.

By FREDERICK HOFFMAN, M. D.
Phyſician to his preſent Majeſty the King of Pruſſia.

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BRITISH MUSEUM
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ON

FOOD, DIET,

OR

ALIMENT.

THE Health of the human Body evidently depends upon the Quantity and Quality of the *Blood* and *Juices*; whence it is plain, that all thoſe Aliments which preſerve and maintain a juſt Temperament, and a due Quantity of theſe, are beneficial to Health; and that ſuch as have a contrary Tendency, are to be reckoned unwholeſome.

For *Blood* of a juſt Temperament, neither exceeding nor falling ſhort in Quantity, as it circulates with the greateſt Eaſe through the

Body, and is free from all foreign Particles, is admirably adapted to nouriſh the Parts, and increaſe Strength; ſo that it may be called *the real Treaſure of Life.*

Blood of a due Temperament, and benign Quality, by its progreſſive as well as inteſtine Motion, which continues during the whole Courſe of Life, is not only continually waſting, but likewiſe acquires a morbid Diſpoſition, and degenerates into an impure and excrementitious Maſs.

Experience has ſhewn, that the Blood of thoſe who have faſted long, is converted into ſaline and bilious Excrements, which are diſcharged by Stool, Urine, and Sweat, and even loſes that natural balſamic Quality, which is neceſſary to Health; and the Maſs of Humours is by this Means rendered ſo thin and fluid, that it becomes entirely unfit for nouriſhing the Parts. This appears ſtill more plainly from continual Fevers, and hectic Diſorders, the Nature of theſe Diſorders being to waſte the Juices, and convert the moſt benign Humours into uſeleſs Salt,

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and bilious Excrements. Labour alſo, and Exerciſe, becauſe they augment the inteſtine and progreſſive Motion of the Blood, conſiderably leſſen the Quantity of ſuperfluous Humours; as Perſons of full plethoric Habits experience, to the no ſmall Advantage of their Health.

Becauſe the Blood, by its continual Motion, is waſted and converted into an excrementitious Maſs, utterly unfit for nouriſhing the Solids, or recruiting that fine Fluid which ſupplies the Body with Senſe and Motion; it is plain that Life and Health cannot be preſerved, unleſs thoſe natural Motions be continually repaired, and new Juices ſubſtituted in the Room of thoſe thrown out of the Body as excrementitious.

The Reaſon is therefore plain, why People ſtand in need of continual Eating, Drinking, and Evacuations; for Health cannot long be preſerved, unleſs the Place of the corrupted Humours diſcharged, be ſupplied by new Juices.

Solid Food of a good Quality, as well as Liquors, recruit the loſt Juices; and therefore all thoſe Aliments that are nearly of the ſame Nature with the Blood, and eaſily mix with it, ought to be reckoned among wholeſome Aliments.

The Fleſh of young Animals, their Juices, and Broths made of them, eſpecially of young Oxen, Veal, and Mutton, afford a large Quantity of Jelly, and on that Account are juſtly reckoned among the Aliments that are moſt quickly converted into Blood. All Sorts of Poultry and Pigeons, with their Young, are likewiſe well diſpoſed for Nouriſhment; becauſe they afford a more ſubtile Jelly, though in a ſmaller Quantity, than the Fleſh abovementioned.

It is worth while to obſerve, that the clean Animals, which *Moſes* commanded the *Iſraelites* to uſe in their Sacrifices, were in general ſuch as afforded a good and wholeſome Nouriſhment, abounding more than others in nutritive mucilaginous Juices.

Broths and Jellies made with Fleſh, are therefore with good Reaſon preſcribed for recruiting the Strength of thoſe, who either by Fevers, or Hemorrhages, or Bleedings, have ſuſtained a Loſs of Blood; and People who feed much upon thoſe mucilaginous Aliments, which the *French*, above all other People in the World do, can bear to have Blood taken from them more frequently, and in greater Quantities, than People who are not ſo much accuſtomed to them.

The Chyle is the immediate Matter of the Blood, and reſembles a natural Emulſion, made of ſoft, oily, inſipid, watery, and mucilaginous Particles; and therefore all Aliments compoſed of Parts reſembling this, are proper for nouriſhing the Body, and producing Chyle, and conſequently Blood.

Milk, which is nothing but Chyle, is an univerſal Aliment, and with regard to Nouriſhment, preferable to all others.

And for this Reaſon, Milk is given, as the firſt Aliment, not only to Children, but to robuſter Animals, that their Bodies may grow the faſter, and ſooner acquire Strength and Maturity; for Food that is ſolid, of a firm Coheſion, and hard of Digeſtion, does not well agree with young and tender Bodies, becauſe the Stomach and Inteſtines have not yet acquired that Strength and Force, neceſſary in the Digeſtion and Expulſion of ſolid Foods. Hence a Reaſon may be aſſigned, why ſome People, eſpecially the *Swiſs*, who are great Lovers of Milk, and make much Uſe of it in their Food, grow ſo very large and tall, that ſcarce any Nation in *Europe* can equal them in that Particular. *Pliny*, *Tacitus*, *Juſtin*, *Cæſar* and *Salluſt*, give us Accounts of many, who by the Uſe of Milk, have lived to a great Age; and *Galen* * mentions a Man, who uſing no other Food than Milk, lived more than a hundred Years. In *Holland*, and ſome northern Countries, and alſo in

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* Lib. v. Cap. 7. *de Sanitate tuenda.*

Frieſland, many uſe Milk inſtead of Beer, for their ordinary Drink; and *Ovid* * gives us the Senſe of Antiquity, with regard to Milk, in the following Lines.

Lacte mero Veteres uſi memorantur et Herbis,
Sponte ſua ſi quas Terra ferebat †.

All mild Seeds which abound with a milky Juice, are to be reckoned among the Claſs of nouriſhing Aliments.

Hence we ſee the Reaſon why Seeds and Grains of moſt Kinds, ſuch as Wheat, Barley, Oats, Rye, Beans, Peaſe, Almonds, Cheſnuts, Pine-Nuts, Fuſtic-Nuts, Rice, *Indian* and *Turkiſh* Corn, are extremely proper for nouriſhing Animals; and why the Meals of theſe, baked into Bread, are the principal and moſt general Aliments made uſe of; hence alſo we may be able to account for Perſons being able to live tolerably on Bread and Water only.

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* Lib. IV. Faſt.

† In former Times, ſaid he, the Antients made
A Feaſt of Things that eas'ly might be had,
As *Milk* and *Herbs*, with bulbous Roots and Oil,
The conſtant Produce of their native Soil.

Of all the Aliments Bread holds the principal Place, nor can we poſſibly be in want of it, without injuring our Health. Its Uſe is proper at all Seaſons, and accommodated to all Conſtitutions, and may therefore be called an univerſal Aliment; nor can Fleſh, Fiſh and the like be eaten without it, as they cauſe a Sickneſs at the Stomach.

The Texture of the Parts of Bread is admirably adapted to the Nature of the nutricious Juices; for it is mixed with mild, oily, and mucilaginous Particles, and alſo with a ſubtile acid Salt, which is very grateful to the Stomach, and quickens the diſſolving Power of the Juices. But as all Bread is not made of one and the ſame Grain, ſo one kind of Bread is preferable to another, with regard to its healthful Qualities. The beſt and moſt nouriſhing Bread is made of Rye-meal, not very white; but mixed with the ſmaller and finer Parts of the Bran. For blackiſh coarſe Bread yeild by Diſtillation more Oil, which has a more agreeable Flavour, and more effectually recruits Strength, than that drawn from fine Bread. But Bread made with Barley, Oats, *Turkey* Corn, or even of Acorns or Cheſnuts, is heavier on the Stomach, and, at the ſame Time, leſs effectual in repairing loſt Strength.

Eggs, if new laid, and not boiled hard, afford a very ſpeedy Nouriſhment. The Yolk contains many unctuous, fat and ſulphureous Parts; the White, on the othe Hand, conſiſts of moiſt, balſamic Parts, like thoſe of the Serum; ſo that if any Food be univerſal, this is certainly ſuch. Eggs are of all other Things moſt proper when the Body, either weakened by an Effuſion of Blood, or waſted by the Shocks of a Fever, requires an immediate Supply of Nouriſhment. They are vaſtly beneficial to old Men, who ſtand in need of good Nouriſhment, and ſuch as may be eaſily digeſted in the Stomach.. But, on the contrary, I do not approve of their being uſed by thoſe who have their Stomachs loaded with Bile, or any Collection of acid Humours; becauſe the more Bodies abounding with impure Juices are nouriſhed, the more they are injured by that very Means. They are known to be freſh by their being pellucid or clear, when expoſed to a bright Light, and by their retaining their milky Liquor after being boiled over a ſtrong Fire.

Cheeſe and Butter are univerſal and moſt excellent Aliments.

Since Milk is made into Butter and Cheeſe, and ſince the former contains its oily, and the latter its mucilaginous and terreſtrial Parts, it is plain that theſe two, eſpecially with the Addition of Bread and Water, muſt be a very valuable and univerſal Nouriſhment, fit for Perſons of all Ages and Conſtitutions. The newer the Butter is, the more grateful it is to the Stomach, and at the ſame Time the more conducive to Health; but when long kept, it grows fetid and rancid. The too great and too conſtant Uſe of it, however, by relaxing the Fibres of the Stomach, weakens its Tone, and excites Nauſeas. Butter joined with Cheeſe is alſo very nouriſhing, but Cheeſe ſhould be neither too new nor

nor too old. If too new, it loads the Stomach, and binds the Belly; if too old, it increaſes the Acrimony and Impurity of the Humours, as it is endowed with a poignant Taſte and fetid Smell.

As the Blood, the nutritive Juices, and in general all the Parts of the Body, are compoſed of three Elements, the firſt of which is ſulphureous, oily, and inflammable, the ſecond earthy, ſubtile, and alcaline, more or leſs fixed, and the third aqueous; ſo the ſeveral Kinds and Virtues of Aliments, may be commodiouſly reduced to theſe three Claſſes.

Aliments of theſe three ſeveral Qualities, duly mixed with one another, afford a proper Nouriſhment for the human Body.

The Fleſh of Animals, eſpecially when roaſted, affords the Body its principal Supply of the ſulphureous Part; but it muſt be obſerved, that wild Animals are preferable in this Reſpect, to thoſe of the tame and domeſtic Kind, becauſe their Oils and Salts are exalted by habitual Exerciſe.

That the Fleſh of Animals contains more of a ſubtile Oil than Vegetables, is plain from this, that in the Summer Fleſh very ſoon turns putrid and offenſive, which is not found to be the Caſe with regard to Vegetables.

Vegetables having an Acid in their Compoſition, and their Oils, excepting ſome of the hotter Herbs, are for that very Reaſon ſo much the milder. Animals, on the other Hand, have no Acid in their Compoſition; for all Parts of them, ſubjected to Diſtillation, yield a ſubtile Oil and a volatile Salt; and this hot Oil is what principally excites an inteſtine and fermentative Motion in the Blood, and proves the Occaſion of the penetrating and diſagreeable Smell excited by Putrefaction.

The roaſted Fleſh either of wild Beaſts, or wild Fowls, furniſh the Blood with a greater Quantity of a light ſulphureous Subſtance,

ſtance, than boiled Fleſh, or thoſe of tame Animals.

The Fleſh of wild Animals, or Wild Fowls, is undoubtedly lighter, more ſubtile and oily, but at the ſame Time has a leſs Quantity of gelatinous, balſamic Matter, than the Fleſh of tame Animals; becauſe the wild uſe more violent Exerciſe, and feed upon drier Aliments. Add to this, that, by the very Roaſting, much of the Humidity is evaporated, by which Means the oily Principle of diſintangling itſelf from the reſt of the component Parts, and being exalted by the Fire, enjoys its full Liberty, and gains the Aſcendant over the other Parts.

Among the Aliments that furniſh the Blood with its aqueous Parts, Fiſh, Pot-Herbs, the milder Roots, and ſome Kinds of Summer Fruits are reckoned the principal.

To the third Claſs of Aliments, which ſupply the Blood with its fixed and earthy Parts, belong all Kinds of Bread, Rice, Peaſe, Beans, Lentils, Cheſnuts, Almonds, Cacao, Cheeſe, *&c.*

From what has been ſaid it follows, that all ſuch Aliments as are of a mild Quality, and reſemble Chyle and Blood, are fit for Nouriſhment. And that all ſuch Aliments as either recede from, or are oppoſite to the Nature of Chyle and Blood, are improper for nouriſhing the Parts.

All Aliments in which there is too much Acidity, are unfit for Nouriſhment; becauſe Milk and Blood will not mix with an Acid, being quite oppoſite to their Natures, and induce a Coagulation of the circulating Juices.

Hence the Reaſon is plain, why the too liberal Uſe of Salads, Summer Fruits, eſpecially when crude and unripe, Vinegar, ſour Ale, and Wines that abound with an Acid, are ſo remarkably prejudical to Health.

No Salt whatever can be mixed with the Blood, Chyle and Milk; for which Reaſon all Salts, and all Foods too much ſalted, muſt be improper and unfit for Nouriſhment.

Blood or Chyle never incorporate with ſpirituous Liquors, but rather ſeparate from them; whence we may eaſily judge how detrimental the free Uſe of them is, both with regard to Health and Nouriſhment.

All ſweet Subſtances, as Sugar and Honey, have no Affinity with the Blood and Chyle, but rather recede from their Nature, ſince they have an exquiſite Taſte, which the Blood and Chyle have not.

Though ſweet Subſtances conſiſt of a temperate Mixture of Parts, and may on that Account ſeem proper for Nouriſhment; yet the ſweet Particles are Salts of a peculiar Kind, which are diſſoluble in Water; they cannot therefore be joined to the Subſtance of the Parts, becauſe they are liable to be diſſolved by the circulating Fluids.

Aliments, proper for preſerving Health, ought not only to contain a laudable Juice, but ſhould alſo be eaſily diſſolved by the Stomach. Hence it is plain, that all thoſe kinds of Food, which, on account of the Cloſeneſs and Compactneſs of their Texture, are with Difficulty diſſolved, are for that very Reaſon leſs conducive to Health.

The Fleſh of old Animals, Fleſh dried in the Smoke, hard Eggs, Sea-Fiſh of moſt Kinds dried, and very coarſe Bread, on account of the rigid and complicated Texture of their Parts, are for that very Reaſon concocted with ſome Difficulty by the Stomach, and converted into Juice and Blood.

As theſe hard and compact Foods require much Warmth, Abundance of fermentative and ſalival Lymth, and a ſtrong Stomach to disjoin and break their complicated Textures, ſo they agree only with robuſt Conſtitutions, and People that labour hard; for this Reaſon, the Inhabitants of ſome Northern Countries, as *Sweden*, *Norway*, *Lapland*, *Finland*, *Weſtphalia*, and *Pomerania*, are not eaſily injured by Foods of this Kind; becauſe their Stomachs, being naturally vigorous, and at the ſame Time ſtrengthened by Cuſtom, eaſily diſſolve and digeſt them.

Vegetables, Roots, Fruits and Herbs, eſpecially if eaten crude, and before they are ſufficiently ſoftened by Boiling, are with Difficulty concocted by the Stomach, becauſe their fibrous texture is hard to be diſſolved.

Aliments of the vegetable kind, are alſo for the ſame Reaſon heavy on the Stomach, ſince they produce many Flatulences, which diſturb and diſorder the firſt Paſſages.

To this Claſs likewiſe belong unripe Fruits, Peaſe, Beans, Turneps, Rape, bulbous Roots, the ſeveral kinds of Cabbage, Garlick, Onions, Radiſhes, Sallads prepared of Lettuce, and other Herbs, Pears, Apples, Plums: Honey and Water, Honey, Muſt and all ſweet Fruit of whatever kind; for the Nature of theſe is ſuch, that they eaſily ferment, or even become ſour, and by Reaſon of their vicid, adheſive Quality, are reſolved into Fumes and Vapours.

The tenacious and glutinous Parts of Animals, among which are the Stomach, the Inteſtines, the Milt, the Kidneys, the Ears, the Skins, and the Claws, are of hard Digeſtion, and do not, without Difficulty, yield to the Menſtruum of the Stomach.

Fat Subſtances are not eaſily digeſted by the Stomach; for if an Acid, with which Vegetables principally abound, be added to them, they coagulate.

Fat Foods require an alcaline Liquor for breaking and disjoining their complicated Textures; for which Reaſon a good deal of Bile is requiſite, to prevent their proving hurtful to the Stomach. For when an Acid attempts the Solution of fat Subſtances in the Stomach, hot, ſulphureous Vapours and Eructations, or breaking Wind, are cauſed, which are very troubleſome.

The

The more viſcid, rancid and old, fat Subſtances are, the more difficult they are to digeſt; the new and freſh, yield much ſooner to the Action of the Stomach.

Hence, the Reaſon is plain, why the Fat of Beef is not ſo hurtful when uſed in the Preparation of food, as that of Mutton, Swine, or Geeſe. Hence alſo, a Reaſon may be aſſigned why old Fleſh, ſuch as is hardened in the Smoke, as Bacon which has acquired a Ruſtineſs and yellow Colour, is highly improper for the Preſervation of Health.

It is neceſſary, in order to perform the office of the Nutrition, that the ſmall Mouths of the internal rough Coat of the Inteſtines abſorb the Chyle, and convey it to the Blood; conſequently none of thoſe Aliments which either obſtruct, or too much conſtringe their Mouths, can be uſed without, in ſome Meaſure injuring Health.

Since the Maſs of Aliments, after being drained and exhauſted of their nouriſhing Parts, by the Separation of the Chyle, ought, by the expanſive and contractile Force of the Inteſtines, to be thrown off from them, it muſt follow, that all thoſe Aliments are prejudicial to Health, which either paſs through the Inteſtines with difficulty, ſtop their Motions, or weaken their Tone, and impair their Strength, by ſuppreſſing Excretion ſo neceſſary to Health.

All Aliments that are acid, aſtringent, mouldy, glutinous, viſcid, auſtere, or ſuch as are eaſily coagulated, are for this Reaſon prejudicial to Health, becauſe they weaken the tone of the Inteſtines, and by that means, prevent the ſuperfluous Excrements from being diſcharged.

This Characteriſtic of Unwholeſomeneſs, belongs to all unripe Summer Fruits, Pears, Quinces, Pomegranates, Medlars, Sloes; alſo to Sea-biſcuits, the Cruſt of Bread, and ſuch as is mouldy, hard, too coarſe, or eaten warm from the Oven, Gruels made of Peaſe, Beans, Lentils, and Millet Cakes or Bread, that are heavy, or not ſufficiently fermented, Cheeſe eaten in too great Quantity, all milky and fat Subſtances; all theſe hurt the Conſtitution ſtill more remarkably, if Wine, Acids, or cold Liquors are drank with them; for by this means they are firmly coagulated, and adhere very ſtrongly to the Coats of the Inteſtines, incruſtating the Orifices of their ſmall abſorbent Veſſels; cauſing Flatulences or Wind, and Convulſions.

The Unwholeſomeneſs of Aliments is to be eſtimated from their impairing the fermenting and diſſolving Powers of the Stomach, ſince by that means Crudities are generated.

The Action of the fermenting Juice is impaired by all fat, oily, and very ſweet Subſtances; by Honey, Hydromel, or Honey and Water, new Grapes, Summer Fruits, green Figs; the fibrous Roots of Pot-herbs, Cheeſe and curdled Milk; all which are more prejudicial to Health, the greater Quantity of them is taken into an empty Stomach.

Every Acid, and every Putrefaction are prejudicial to Health; and therefore all Aliments which eaſily grow ſour or putrid in the Stomach, may be juſtly reckoned unwholeſome.

An Acid is equally injurious to the firſt Paſſages and the Blood; for it deſtroys the alcaline and balſamic Quality of the Bile, coagulates the Chyle, and retards the Expulſion of the Excrements. Add to this, that when it is mixed with the Blood, ſtagnations of the Juices, and burſting of the Veſſels are often the Conſequence. And when the firſt Organs of Digeſtion are affected by putrefied Aliments, and the Putrefaction extends itſelf towards the more internal Parts, it communicates its own Diſpoſition to the wholeſome Juices. Among thoſe Foods, which by their long Continuance in the firſt Paſſages grow acid, may be reckoned all Summer Fruits, Milk, Honey, almoſt all Sorts of Tarts, ſweet Wine of ſeveral Kinds, Muſt, Hydromel, and unfermented Bread; and thoſe Aliments which ſooneſt grow putrid by a long Stay in the firſt Paſſages, as boiled Fleſh; for of all Aliments uſed by us, none have a greater Tendency to Putrefaction than Fleſh. It is therefore, for very valuable Purpoſes, that Nature in acute Diſeaſes, and in Habits abounding with impure Juices, of her own accord, loaths and abhors Fleſh; and thoſe Phyſicians properly aſſiſt Nature in carrying on her Deſigns, who, in ſuch Caſes, forbid their Patients the Uſe of nouriſhing Broths; for Aliments of this Kind ſurpriſingly increaſe the Putrefaction, which is the true Cauſe of the Malignity. For this Reaſon, when Peſtilences, or other epidemical Diſeaſes rage, it is adviſeable to abſtain from Fleſh, and uſe acidulated Liquors, which ſtrongly reſiſt Putrefaction, and by that Means prove remarkably ſerviceable; but this is to be underſtood of thoſe Conſtitutions which are infirm, weakened by Fevers, or loaded with impure Juices; ſo that Hippocrates was very juſt in his Obſervations, That *the more Bodies, abounding with impure Juices, are nouriſhed, the more they are injured.* Corrupted Fiſh, putrid Fleſh, or that of Animals which laboured under any Diſeaſe, have, of all other Kinds of Food the ſtrongeſt and moſt direct Tendency to produce a Putrefaction in the Body.

AN ESSAY ON DIGESTION.

ALL our Food conſiſts of animal or vegetable Subſtances, Salt and Water, alone excepted; and many of theſe require a culinary Preparation, in order to render them the more eaſily diſſolvable, by the Actions employed in their Reſolution. The Buſineſs of Cookery therefore, is to diminiſh the Coheſion of the Parts of alimentary Subſtances, and partially digeſt them before they are taken into the Mouth; to harden them therefore by dreſſing, is an Error of the worſt Conſequence with reſpect to Health, however it may indulge the Palate.

Aliments then, either prepared or crude, are taken into the Mouth, where they are comminuted by Chewing, mixed with the Saliva, and prepared for a future perfect Digeſtion, towards which, this is the firſt Step. Manducation or Chewing is performed by means of the *Biventer* [1], or digaſtric Muſcles, which in acting draw the Chin towards the Breaſt, and open the Mouth; which is again cloſed by the Action of temporal Muſcles, the *Maſſeter* [2], the external and internal *Pterygoide* [3] Muſcles, which being very ſtrong, preſs the Jaws together with a prodigious Force.

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[1] The Biventer or digaſtric Muſcle, ſo called from its double Belly, is a Muſcle of the lower Jaw, which, in Acting, it pulls down, by the Help of an annular Pulley.

[2] A Muſcle of the lower Jaw, which it helps to pull upwards in eating.

[2] Muſcles of the lower Jaw, the internal draws the Jaw to one Side, and the external draws it forwards.

The firſt Part of Manducation conſiſts in the inciding, or cutting the Aliment with the Fore-teeth, which is called Biting; the Food is then applied to the double Teeth called Grinders, by the varied Actions of the *Buccinators* [4], the orbicular Muſcle of the Lips, the *Zygomatics* [5], the *Elevator Labiorum communis* [6], the *Elevatores Labii ſuperioris propriæ* [7], the *Elevator Labii inferioris proprius* [8], the *Depreſſor Labii inferioris proprius* [9], the *Depreſſor Labiorum communis* [10], the *Obliquus Labii inferioris* [11], and the *Platyſma Myoides* [12], when theſe act all together, the Cheeks and Lips are applied ſo cloſely to the Teeth, that no Part of the Aliment, whether ſolid or fluid, can fall from between the Teeth externally; but when they act ſeparately, the Aliment is applied to the Teeth in ſuch a Manner as the Circumſtances moſt require. The Tongue alſo has a very conſiderable Share in applying the Aliment properly to the Teeth. The Action of Maſtication is of ſo much Importance to Health, that *Hippocrates* long ago obſerved, that thoſe, whoſe Teeth are good, live to a very old Age. It is therefore a very great Error to ſwallow the Food before it is duly maſticated.

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[4] Muſcles on each Side of the Face, common to the Lips and Cheeks, forming the inner Subſtance of the latter. They contract the Cavity of the Mouth, by which Means the Food is thruſt forward to the Teeth in Maſtication.

[5] A Muſcle inſerted near the Angle of the Lips, which it helps to draw obliquely to one Side.

[6], [7], [8], [9], [10], [11], [12], The Names of different Muſcles of the Lips, pulling their different Parts into which they are inſerted into different Poſitions.

During the Action of Maſtication, the divided Aliment is intimately mixed with the Saliva diſcharged from the *parotid Glands*[13], the internal *maxillary Glands*[14], and the *ſublingual Glands* [15], by innumerable ſmall Ducts in the Tongue, Palate, Gums, and Lips, and from Glands ſituated in the anterior and inferior Parts of the Palate, from the *Uvula* [16], and from the *Tonſils* [17]. This Saliva is a thin pellucid Fluid, which does not concrete by heat; is almoſt void of Taſte and Smell, and when agitated, forms a tenacious Froth; it is ſeparated by the Glands from the pure arterial Blood, and during Hunger is more copious, and acrid; after long Faſting it is very acrid, penetrating, detergent, and diſſolvent; it excites and increaſes Fermentation in farinaceous, or mealy, and ſucculent vegetable Subſtances, and Syrups; it is ſwallowed in both Men and Brutes, during Sleep, in a healthy State; and if wantonly ſpit out, loſs of Appetite, Indigeſtion, and Waſtings of the Body are excited: It conſiſts of a pretty large Proportion of Water and Spirits, and a ſmall Quantity of Oil and Salt, which are united into a natural Soap, very well ſuited to divide the Aliment, and make a perfect Solution.

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[13] The Glands, or Kernels behind the ears. They are what Anatomiſts call conglomerate Glands, that is, made up of a great number of ſmaller Glands, whoſe excretory Ducts unite, and form one Canal, through which the Saliva is diſcharged into the mouth.

[14] Glands ſituated within the Under-Jaw, one on each Side. They are alſo of the conglomerate Sort, and the excretory Pipes of the ſmall Glands uniting, form two Ducts, both which open under the Tip of the the Tongue, on the Inſide of the Fore-teeth of the lower Jaw.

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[15] Glands on each Side of the Tongue. Theſe have generally two excretory Ducts, formed by the Union of thoſe from their ſmall component Glands, diſcharging the Saliva into the Mouth on each Side the Tongue near its Tip.

[16] The Uvula is a Production of the internal Membrane of the Mouth; its Subſtançe is very lax, and furniſhed with a number of ſmall Glands. It is of a conic Figure, and hangs from the Root of the Mouth, at the Extremity of the Paſſage coming from the noſe.

[17] Theſe are round Glands, or Almonds, placed on the Sides of the Baſis of the Tongue, under the common Membrane of the Fauces, with which they are covered, each of them has a large Duct, which opens into the Fauces, diſcharging a mucous and ſlippery Matter into the Fauces, Larynx and Œſophagus, for the moiſtening and lubricating thoſe Parts.

Hence, we ſee evidently the Error which thoſe commit, who laviſh this ſalutary Fluid, and ſollicit a Diſcharge thereof by ſmoaking, or chewing Tobacco, or any other Means.

The alimentary Maſs thus maſticated, and moiſtened, is thruſt towards the *Fauces*[18], while the Teeth are cloſed, the Aliment confined within them by the Contraction of the Muſcles of the Lips and Cheeks, and the Tongue is ſo directed, as to occupy all the Space between the Teeth of the Upper Jaw and the Palate. Mean time, the *Genioglofſi* [19], *Styloglofſi* [20], and *Ceratoglofſi* [21], acting ſucceſſively, form a Cavity at the Root of the Tongue, under the pendulous Part of the Palate, the Uvula and the Tonſils; but above the *Larynx* [22], and *Pharynx* [23], and before the Membranes which cover the Bodies of the Vertebræ of the Neck, and poſterior Muſcles of the Pharynx, and bring thither all the Aliment to be ſwallowed down. Then the Root of the Tongue is expanded, elevated and brought forwards by the Action of the *Genioglоſſi* [24], *Myloglоſſi* [25], *Geniohyoidæi* [26], *Mylohyoidæi* [27], *Styloceratohyoidæi* [28], while the *Os Hyoides* [29], is applied to the pendulous Part of the Palate, and the Paſſage leading to the Noſe is cloſed. At the ſame time the *Os Hyoides* and *Larynx* are elevated by the Contraction of the *Thyrohyoidæus* [30]. Hence the Aliment to be ſwallowed

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[18] The Fauces is the Space about the Mouth, above the Gullet and the Windpipe, and may be ſeen when the Mouth is open and the Tongue depreſſed.

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[19] A Pair of Muſcles of the Tongue, ariſing from the Inſides of the Fore-part of the lower Jaw, and inſerted into the Root of the Tongue, ſerving to pull it out of the Mouth.

[20] A Pair of Muſcles of the Tongue, inſerted into the Root of the Tongue, which draw it upwards.

[21] A Pair of Muſcles of the Tongue, ariſing from the Sides of the Os Hyoides, and inſerted into the Root of the Tongue, which they pull directly into the Mouth.

[22] The Larynx, is the upper Part of the Trachea, or Windpipe, lying below the Root of the Tongue, before the Pharynx. It is that Protuberance in the Upper and Fore-part of the Neck, called Pomum Adami, or Adam's Apple.

[23] The Pharynx is the ſuperior Part of the Œſophagus, and may be compared to the wide Part of a covered Funnel, of which the Œſophagus is the narrow Part or Tube.

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[24], [25] The Name of two Pair of Muſcles of the Tongue; the Genioglоſſi have been already deſcribed, (Note 19.) the latter are ſituated tranſverſly, between the Ramus of the lower Jaw, and the Baſis of the Tongue.

[26], [27], [28] Muſcles of the Os Hyoides, which they move, together with the Tongue.

[29] The Os Hyoides, or Bone of the Tongue, is ſituated in the middle Space, between the Angles of the lower Jaw. It is a ſmall Bone, and reſembles, in ſome Meaſure, the Baſis of the lower Jaw, or a ſmall Bow. The ancient Greeks compared it to their Vowel υ, and thence it acquired its Name. The principal uſe of it is to be the Baſis and Support of the Tongue.

[30] Another Pair of Muſcles belonging to the Os Hyoides.

ſwallowed preſſes upon the *Epiglottis* 31, while the Uvula is depreſſed by its proper muſcles, and the Chink of the *Glottis* 32, cloſed. At the ſame Time the *Genioglоſſi*, *Myloglоſſi*, *Geniohyoidæi*, and *Mylohoidæi*, move the Root of the Tongue, *Os Hyoides* and *Larynx* forwards; and thus opens the *Pharynx*, which is annexed to the Root of the Tongue, the *Os Hyoides* and *Larynx*. And thus the *Fauces* 33, are opened, and Room made for the Aliment to be ſwallowed; eſpecially when, at the ſame Time, the external Pherygoide Muſcles, and ſome Fibres of the Maſſeter, draw the whole under Jaw forwards, making more Room, and bringing forwards the *Gloſſopharin-*

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[31] The Epiglottis is a ſmall Cartilage, in the Shape of a Tongue, which covers the Orifice of the Windpipe.

[32] The Glottis is the Chink in the Larynx, through which the Air paſſes into the Wind-pipe; this Chink is covered by the Epiglottis, to prevent any extraneous Subſtances from paſſing down it.

[33] The Fauces is deſcribed in Note 18.

gæi,[34], *Hyopharyngæi*[35], *Thyrophryngæi*[63], and *Cricopharyngæi*[37], By this means the upper Part of the Pharynx is dilated and applied to what is to be ſwallowed, and while the upper Orifice of the Pharynx cloſes, the Stylopharyngæi are contracted, and the Muſcles of the *Oeſophagus*[38], relaxed, for the farther Paſſage of the Aliment. At the ſame Time the internal and external Muſcles of the *Gargareon*[39], act in ſuch a Manner, as to elevate and expand the Veil of the Palate, and to prevent any Particles from falling either into the Chink of the *Glottis*, or Paſſage to the Noſe. The very Inſtant afterwards, all the Muſcles abovementioned are ſuddenly relaxed, and both the *Sternohyoidæi* 40, *Sternothyroidæi* 41, and *Coracoceratohyodæi* 42 act; by which mechaniſm the broad poſterior Surface of the *Cucoide* 43, Cartilage is preſſed downwards and backwards againſt the *Pharynx*. And at the ſame Moment the *Gloſſoſtaphylini* 44, *Pharyngoſtaphylini* 45, and *Azygos* 46,

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[34], Muſcular Fibres, running along the lateral Edges of the Tongue, down to the Sides of the Pharynx.

[35] Muſcles ariſing from the Pharynx, and inſerted into the Os Hyoides.

[36] Broad Muſcles ariſing from the Pharynx, and inſerted along the Outſide of the Proceſſes of the Thyroide Cartilage.

[37] Muſcles ariſing from the Pharynx, and inſerted into the lower Part of the Cricoide Cartilage.

[38] The Oeſophagus, is a Canal ſituated behind the Wind-pipe, and Vertebræ of the Back, extending from about the Middle of the Neck, where the Pharynx ends, to the upper Orifice of the Stomach ;through this Canal, the Food after Maſtication, paſſes to the Stomach.

[39] The ſame with the Uvula, deſcribed Note 16.

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[40] A long flat Muſcle ſituated on the Fore-ſide of the Throat, fixed by its lower Extremity to the poſterior Side of the Sternum, or Breaſt-bone, &c. and inſerted laterally into the lower Edge of the Baſe of the Os Hyoides.

[41] Two Muſcles, like Ribbands, but broader above than below, ſituated along that Part of the Neck which lies between the Thyroide Cartilage and the Breaſt Bone.

[42] Muſcles ariſing from the Caracoide Proceſs, and inſerted into the Baſis of the Os Hyoides.

[43] An annular Cartilage belonging to the Larynx, reſembling a kind of thick, irregular ring, very broad on one Side and narrow on the other; or it may be reſembled to a ſmall Portion of a thick Tube cut horizontally at one End, and very obliquely at the other. This Ring is the Baſe of the five Cartilages that make up the Larynx.

[44] Muſcles ariſing from the Baſis of the Tongue, and inſerted into the Staphyle or Uvula.

[45] Muſcles ariſing from the Pharynx, and inſerted into the Staphyle, or Uvula.

Muſcle of the *Morgagni*, act with a kind of convulſive Motion and great force; ſo that the pendulous Veil of the Palate then diſtended and expanded upwards, is ſuddenly drawn downwards, in ſuch a Manner, as to preſs the Aliment into the Orifice of the *Oeſophagus*, now elevated, and dilated by the Contraction of the *Gloſſoſtaphylini*, and *Pharyngoſtaphylini*. Theſe concur in the ſame kind of convulſive Motion with the *Gloſſopharyngæi*, *Hyopharyngæi*, and *Thyropharyngæi*; by which the Tongue, *Os Hyoides*, *Larynx*, and poſterior Part of the *Pharynx* are ſo preſſed together, as to aſſiſt, at the ſame Time, with conſiderable Force, the Intruſion of the Aliment into the Orifice of the Oeſophagus. Thus the *Pharynx* is cloſed, whilſt the Oeſophagus contracts, and the Aliment is contained in the Cavity of the Oeſophagus under the Pharynx, and is immediately farther protruded into the Stomach, by the Contraction of the longitudinal and orbicular Fibres of the muſcular Coat of the Oeſophagus.

By this exquiſite Mechaniſm is the Aliment conveyed to the Stomach. But hence it is evident, that many Diſorders in theſe Parts may interſere with deglutition, render it laborious, or utterly ſubvert it; as Tumours in the Parts ſubſerving thereto, and Palſies of the Muſcles. Deglutition may alſo be prevented by continually ſwallowing of dry Subſtances; for by this means the Mucus, which lines the Inſide of the Fauces, Pharynx or Oeſophagus, is rubbed off and waſted; and thus the Organs ſubſervient to Deglutition are rendered too dry to perform their reſpective Offices. When the Uvula is loſt, or the Veil of the Palate divided, Deglutition is incommoded; in the firſt Caſe, the Perſon thus affected, is ſubject to a cough when he attempts to ſwallow, becauſe a Part of the Aliment is ſubject to fall into the Larynx; in the ſecond Caſe, the Aliment to be ſwallowed paſſes into the Noſtrils.

As ſoon as the Aliment has paſſed into the Stomach, the ſuperior Part of the inferior

Muſcle of the Diaphragm, contracts upon the inferior Part of the Gullet, which paſſes through it, and thus cloſes up the Stomach.

The Food thus moiſtened, and at the ſame Time full of Air, depoſited in the cloſe, moiſt, and warm Stomach, would there ſpontaneouſly begin to ferment, or putrify, according to the different Materials of which it conſiſted, and either way would be greatly changed, either into a ſouriſh, ſaltiſh, rancid, or glutinous Maſs; were it not that the villous or rough Coat of the Stomach, which immediately embraces the alimentary Maſs, ſupplies it perpetually, by innumerable Ducts, with a thin, pellucid, frothy Humour, abounding with Spirits and a little Salt, which, in the moſt voracious Animals, is neither alcaline nor acid, but ſomewhat acrid after long Faſting; and, with a more viſcid and mucous Humour, diſcharged into the Cavity of the Stomach, from the Ducts of certain Glands deſtined for the Secretion of that Fluid.

If it be conſidered that the alimentary Maſs is moiſtened by the Saliva brought perpetually into the Stomach from the Mouth, Fauces, and Oeſophagus; that the Stomach dilutes it by the Humours abovementioned; that the Relicks of former Aliments is mixed and agitated with it; that the Air contained in the alimentary Maſs, by rarifying divides it intimately; and that the Heat of the Part excites and promotes the action of all theſe, it is evident that the Food in the Stomach muſt be macerated, diluted, ſwelled, attenuated, fermented and diſſolved, and thus rendered fit to mix with the animal juices, and pervade the minute Canals of the Body.

Beſides theſe, the Action of the muſcular or fleſhy Coat of the Stomach muſt be taken into Conſideration, as that Coat cloſely embraces all the Contents of this Organ, mixes and grinds them together by a kind of vermicular Motion, expoſes them to the Action of the ſurrounding Parts, retains the more groſs, and expels the more fluid Parts

towards

towards the *Pylorus* [46], and thence into the *Duodenum* [47].

Several other Circumſtances muſt be conſidered as promoting the Digeſtion of the Aliment in the Stomach; as, firſt, the Heat communicated to this Organ by all the ſurrounding Parts. Secondly, the perpetually repeated Strokes of innumerable Arteries in the Diaphragm, or Midriff, the Omentum, or Caul, the Spleen, the Liver, the Pancreas, or Sweat-Bread, the Meſentry, and Peritonæum, upon the Stomach. Thirdly, the violent Vibrations of the Aorta, or great Artery, ſituated immediately under the Stomach. Fourthly, the Action of the nervous Fluid, with which no Part is more copiouſly ſupplied than the Stomach; a Circumſtance not yet perfectly underſtood.

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[46] The Orifice, or that Part of the Stomach that opens into the Inteſtines.

[47] The firſt Diviſion of the Inteſtines, and about twelve Fingers Breadth in Length. The ſuperior Part is connected to the Pylorus, from which, turning downwards, it runs under the Stomach towards the left Side, and ends at the firſt of the Windings under the Colon, or largeſt of all the Inteſtines.

Fifthly, the perpetual Compreſure of the Stomach, and all the abdominal Viſcera, by the reciprocal Action of the diaphragm and abdominal Muſcles, during Inſpiration and Expiration.

The Effects of all theſe Cauſes, acting with united Force, muſt be,

Firſt, To levigate, diſſolve, and intimately mix the moſt eaſily mutible Parts of the Aliment, and ſo preſs them thro' the Pylorus into the Duodenum.

Secondly, To retain the more tenaceous Parts; and, by a Continuation of the ſame Cauſes, to produce the ſame Effects upon them.

Thirdly, To render juiceleſs the Membranes, Tendons, Cartilages, and Bones of Animals; and the Skins, Filaments, and the harder Parts of Vegetables; and thus to expel them out of the Stomach, in order to their being diſcharged by Stool.

It is worthy of Remark, that all the Juices employed in the Work of Digeſtion are neutral and ſaponaceous, and neither alcaline nor acid. Hence appears the Abſurdity of thoſe idle Dreams of Authors, relating to Ferments, or acid or alcaline Menſtruums in the Stomach.

But it is not in the Stomach alone that the Work of Digeſtion is performed; the Duodenum, which is a kind of ſuccedaneous Stomach, has alſo its Share: Here, and indeed in all the ſmall Inteſtines, the Aliments receive a farther Solution, and by the Aſſiſtance of the Liquor of the Stomach and the Bile, are converted into an alimentary Liquor called Chyle, which being ſecreted thro' the Inteſtines from the recrementitious Maſs of Aliments, is, by a peculiar Mechaniſm, conveyed into the Maſs of Blood.

The Chyle itſelf is a milky, inſipid Liquor, conſiſting of oily and mucilaginous Parts, and extracted from the diſſolved Aliments. It is a kind of natural Emulſion, and in order to conſtitute this, it is neceſſary to form a Mixture of oily and aqueous Parts. That Chyle actually conſiſts of theſe Parts, is evident from Milk, which is nothing more than Chyle, and may be converted into Butter, Cheeſe, and Whey.

Hence the Reaſon is plain, why a Man may live upon Bread and Water alone; for theſe Subſtances include, in a proper Degree and Proportion, all the Ingredients of the Chyle and Blood. We alſo ſee the Reaſon, why, in the eaſtern Countries, Rice ſerves the Inhabitants inſtead of Bread; and why, by the Uſe of Barley, Wheat, Oats, Peaſe, Beans, and Cheſnuts, not only Men, but alſo every other Species of Animals become fat. Hence alſo the Reaſon is obvious, why thoſe Aliments, which are not of a temperate Quality, ſuch as acid, ſpirituous and ſaline Subſtances, the Juices of many Vegetables, Herbs, Roots, with acrid and aromatic Subſtances, are improper for producing Chyle, and conſequently for carrying on the Work of Nutrition.

FINIS.